

WHAT IS CLAIMED IS:

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1. An exposure apparatus comprising:
a projection optical system which projects a pattern
of a first object to a second object by using an exposure
beam in order to transfer the pattern from the first object
onto the second object;
a diaphragm which sets a numerical aperture of said
projection optical system; and
a mechanism which keeps temperature of said diaphragm
substantially constant during an exposure operation by said
projection optical system.
2. An apparatus according to Claim 1, wherein said
mechanism comprises a fluid circulation system, which is
provided with said diaphragm, in which a temperature
controlled fluid circulates.
3. An apparatus according to Claim 2, wherein said
mechanism controls the temperature of said diaphragm to be
almost the same as that of said projection optical system,
during the exposure operation.
4. An apparatus according to Claim 3, further
comprising a constant temperature system for said projection

optical system, said constant temperature system providing the temperature controlled fluid to said mechanism.

5. An apparatus according to Claim 1, wherein said mechanism comprises a Peltier element.

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10 6. An apparatus according to Claim 1, further comprising a sensor which detects temperature information of said diaphragm, wherein the temperature of said mechanism is controlled based on the sensor output.

7. An apparatus according to Claim 6, wherein said sensor is located at a position not being irradiated with the exposure beam.

8. An apparatus according to Claim 7, wherein said sensor is provided on said diaphragm, on a side facing the second object.

9. An apparatus according to Claim 1, wherein said diaphragm comprises an iris diaphragm.

10. An apparatus according to Claim 1, wherein said diaphragm comprises a turret having a plurality of openings.

11. An apparatus according to Claim 1, further comprising a reticle stage for holding a reticle as the first object, a wafer stage for holding a wafer as the second object, and said projection optical system comprises an illumination optical system.

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a 11* 12. A micro-device manufacturing method comprising:
projecting, through a projection optical system, a pattern of a reticle to a wafer by using an exposure beam, in order to transfer the pattern from the reticle onto the wafer;
setting a numerical aperture of the projection optical system by a diaphragm;
keeping temperature of the diaphragm substantially constant during an exposure operation by the projection optical system; and
manufacturing a micro-device from the wafer.

13. A method according to Claim 12, wherein said keeping step comprises keeping the temperature of the diaphragm by circulating a fluid proximate to the diaphragm.

14. A method according to Claim 13, wherein the temperature of the diaphragm is kept to be almost the same as that of the projection optical system, during the

exposure operation.

15. A method according to Claim 14, further comprising controlling temperature of the projection optical system as well as that of the diaphragm.

16. A method according to Claim 12, wherein said keeping step comprises keeping the temperature of the diaphragm using a Peltier element.

17. A method according to Claim 12, further comprising detecting temperature information of the diaphragm with a sensor, and controlling the temperature of the diaphragm based an output of the sensor.

18. A method according to Claim 17, further comprising providing the sensor at a location not being irradiated with the exposure beam.

19. A method according to Claim 18, further comprising providing the sensor on the diaphragm on a side facing the second object.

20. A method according to Claim 12, wherein the diaphragm comprises an iris diaphragm.

21. A method according to Claim 12, wherein the diaphragm comprises a turret having a plurality of openings.

22. A method according to Claim 12, wherein said manufacturing step comprises a resist process and a development process.

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